

Northeast of the proposed landing site, stratigraphic relations at about lat 1.5° N., long 359° (observed on VO image 655A64) indicate that this intermediate albedo material overlies somewhat brighter material that crops out in a 100-km-wide band between lat 0 and 5° N. The bright material in turn overlies comparatively dark, heavily cratered highland terrain of Noachian age (VO images 410B04-B07). This bright material covers most of the area previously mapped as the Noachian etched unit. However, the bright material fills older craters as does the intermediate material (but not to the same obscuring degree), indicating that it also is much younger than underlying Noachian materials. High-resolution Viking images (revs 708A and 709A; 25-28 m/p) show that the bright material does indeed appear etched, to the extent that in many places the material erodes into streamlined knobs. These streamlined knobs are likely yardangs. In other areas, the unit has been eroded to expose small scattered mounds or buttes, without streamlining. In several places (for example VO 709A30; 18 m/p) the material forms perfectly circular rimless mesas, indicating that it infilled older craters whose rims appear to have been eroded away leaving the bright material behind. No fluvial features or geomorphic evidence of ground ice is observed. Yardangs and rimless crater fillings indicate that the bright material is lithified and somewhat resistant to erosion. Wind erosion of the bright material may have supplied the material for the windblown bright albedo materials that bound the terrain.

Many impact craters that bound Terra Meridiani appear to be partly filled with the enigmatic deposit. Their floors are filled to variable degrees by younger, similar bright albedo materials. Bounding the west edge of the enigmatic terrain, MOC image 3001 (subframe 3.2 x 3.5 km) shows a bright, wind-eroded deposit on the floor of a 30-km-wide impact crater at 4.2° N., long 5.3°. The MOC image reveals long wind-eroded troughs with scattered mounds or buttes among them. Scatter mounds also can be observed within an inner-crater, bright deposit on the east edge of the terrain at 2.1° N., long 351.5° in high-resolution (16 m/p)

Viking images (709A42-43). These scattered mounds and buttes are nearly identical to those produced by wind erosion of the bright material.

To summarize, in contrast to earlier mapped Noachian-age units, north Terra Meridiani is in reality surfaced by a much younger (cratering age undetermined) material. The enigmatic material is now in the process of being heavily eroded by the wind. Local outcrops of older dark Noachian highland material are superposed by an enigmatic deposit: a bright resistant material, overlain by a somewhat friable, intermediate albedo material. These bright and intermediate materials are about 900 m thick. On its bounding edges, the enigmatic deposit appears to have either blown or flowed up impact crater rim slopes to fill topographic lows of the craters. The characteristic ability to flow over topographic highs is common to both eolian and ignimbrite deposits. The enigmatic material could be eroded eolian material, of uncommon and strikingly different albedo and lithification states, or eroded ignimbrite deposits, having exposed unwelded and welded altered zones. In support of an ash flow origin is (1) the compatible concentration of hematite detected by TES within the unit (some terrestrial ignimbrites are known to be enriched in iron (and other elements) due to postmagmatic, cooling alteration [7]) and (2) the scattered mounds and buttes, exposed in bright outcrops, that are similar to fumarolic mounds formed by vapor escape in terrestrial ignimbrites.

**References:** [1] Scott, D.H. and K.L. Tanaka, 1986, USGS Misc. Invest. Map I-1802-A, 1:15,000,000 scale; [2] Greeley, R. and J.E. Guest, 1987, USGS Misc. Invest. Map I-1802-B, 1:15,000,000 scale; [3] Chapman, M.G., 1999, LPSC 30th CD; [4] Pike, R.J., 1974, *Geophys. Res. Lett.* 1, 291-294; [5] Pike, R.J., 1977, *In Impact and Explosion Cratering*, Pergamon, New York, 489-510; [6] TES Team, 1998, *Dept. of Geol., ASU, Orbits*: Nov. 22, 1997-April 25, 1998; [7] Budding, K.E. et al., 1987, USGS Prof. Paper 1354, 47 pp.

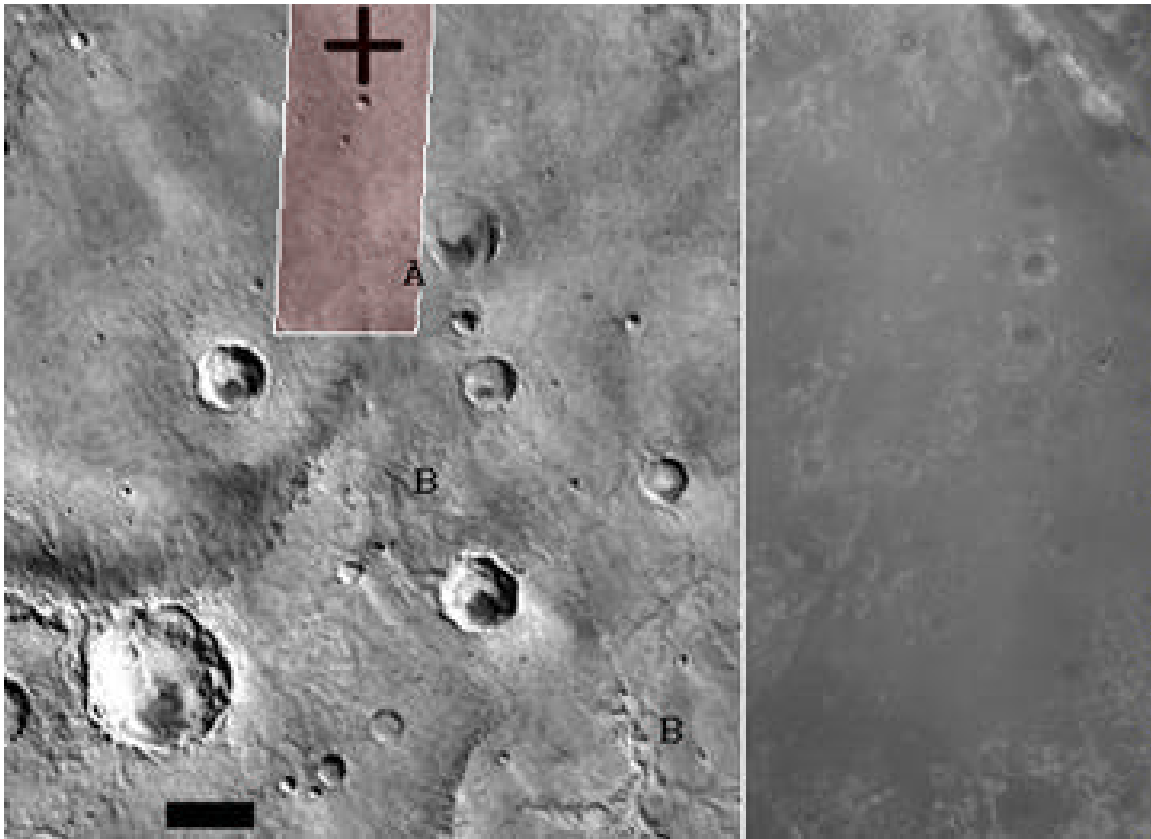


Figure 1. Viking and MOC coverage of landing site region. Viking context image on left shows hematite concentration area (box), 20 km landing site at lat. 1.5 S., long. 5.5 (marked +), location of MOC image 07704 on right (marked 'A'), and ancient highland channels (marked 'B'); scale bar equals 20 km.